UC-7112-LX Plus/UC-7112/UC-7110 Hardware Manual

Sixth Edition, January 2014

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UC-7112-LX Plus/UC-7112/UC-7110 Hardware Manual

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Introduction

The Moxa UC-7110/7112 series of embedded computers are RISC-based, box-type computers that feature dual 10/100 Mbps Ethernet ports, two RS-232/422/485 serial ports, and an ARM9 processor. The computers come with Linux pre-installed. In addition, the UC-7112 Plus and UC-7112 have an internal SD socket for storage expansion to offer high performance communication with unlimited storage in a super-compact, palm-size box. The UC-7110/7112 series of embedded computers are the right solution for embedded applications that call for a small computer, but that can store large amounts of memory and provide good computing performance.

The following topics are covered in this chapter:

- **Overview**
- **Package Checklist**
- **Product Features**
- **Product Specifications**
  - Hardware Specifications
- **Hardware Block Diagram**

Overview

The UC-7110/7112 series of RISC-based communication platforms are ideal for embedded applications. All three computers in the series (UC-7110, UC-7112, and UC-7112 Plus) come with 2 RS-232/422/485 serial ports and dual 10/100 Mbps Ethernet LAN ports to provide users with a versatile communication platform.

The UC-7110/7112 series computers use the Moxa ART ARM9 192 MHz RISC CPU. Unlike the x86 CPU, which uses a CISC design, the ARM9's RISC design architecture and modern semiconductor technology provide these computers with a powerful computing engine and communication functions, but without generating too much heat. The built-in NOR Flash ROM (8 MB for UC-7110/7112, 16 MB for UC-7112 Plus) and SDRAM (16 MB for UC-7110/7112, 32 MB for UC-7112 Plus) give you plenty of storage capacity, and the SD socket provides greater flexibility for running various applications. The dual LAN ports built into the ARM9 allow the UC-71xx computers to be used as communication platforms for basic data acquisition and protocol conversion applications, and the two RS-232/422/485 serial ports allow you to connect a variety of serial devices.

The UC-7110 and UC-7112 come with the µClinux operating system pre-installed, and the UC-7112 Plus comes with the Linux operating system with MMU support pre-installed. Software written for desktop PCs is easily ported to the UC-71xx computers with a GNU cross complier, so that you will not need to spend time modifying existing software code. The operating system, device drivers, and your own software can all be stored in the computers' Flash memory.

Package Checklist

The UC-7110/7112 series currently includes four models:

Standard Operating Temperature Models (-10 to 60°C)

UC-7110-LX
Ready-to-run embedded RISC computing platform with 2 Serial Ports, dual eEthernet, µClinux OS.

UC-7112-LX
Ready-to-run embedded RISC computing platform with 2 Serial Ports, dual eEthernet, SD slot, µClinux OS.

UC-7112-LX Plus
Ready-to-run embedded RISC computing platform with 2 Serial Ports, dual eEthernet, SD slot, Linux OS.

Wide Operating Temperature Model (-40 to 75°C)

UC-7110-T-LX
Ready-to-run embedded RISC computing platform with 2 Serial Ports, dual eEthernet, µClinux OS, Wide Temperature.

Each model is shipped with the following items:

- 1 UC-7110 or UC-7112 or UC-7112 Plus
- Quick Installation Guide
- Document & Software CD
- Ethernet Cable: RJ45 to RJ45 cross-over cable, 100 cm
- CBL-4PINDB9F-100: 4-pin header to DB9 female console port cable, 100 cm
- Universal Power Adaptor
- Product Warranty Statement

Optional Accessories

- 35 mm DIN-Rail Mounting Kit (DK-35A)

NOTE: *Please notify your sales representative if any of the above items are missing or damaged.*

Product Features

The UC-7110/7112 series computers have the following features:

- Moxa ART ARM9 32-bit 192 MHz processor
- 16 or 32 MB RAM (about 12 MB of user programmable space)
- 8 or 16 MB Flash ROM (about 4 MB of user programmable space)
- Dual 10/100 Mbps Ethernet for network redundancy
- 2 software-selectable RS-232/422/485 ports
- Serial port speed from 50 bps to 921.6 Kbps (non-standard baudrates supported)
- SD socket for storage expansion (UC-7112 and UC-7112 Plus only)
- Built-in RTC, Buzzer, WDT
- Built-in Linux Kernel 2.6 platform
- -40 to 75°C wide operating temperature model available (UC-7110 only)
- DIN-Rail or wall mountable
- Robust fanless design

Product Specifications

Hardware Specifications

Computer

CPU: MOXA ART ARM9 32-bit RISC CPU, 192 MHz
OS (pre-installed): µClinux or Linux
DRAM:
UC-7110/7112: 16 MB
UC-7112 Plus: 32 MB onboard
Flash:
UC-7110/7112: 8 MB onboard
UC-7112 Plus: 16 MB onboard

Storage

Storage Expansion: SD slot (UC-7112/UC-7112 Plus only)

Ethernet Interface

LAN: Auto-sensing 10/100 Mbps (RJ45) 2 ports
Magnetic Isolation Protection: 1.5 KV built-in

Serial Interface

Serial Standards: RS-232/422/485 software-selectable (DB9 male) 2 ports
ESD Protection: 15 KV ESD for all signals
Console Port: RS-232 (TxD, RxD, GND): 3-wire pin-header

Serial Communication Parameters

Data Bits: 5, 6, 7, 8
Stop Bits: 1, 1.5, 2
Parity: None, Even, Odd, Space, Mark
Flow Control: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
Baudrate: 50 bps to 921.6 Kbps (supports non-standard baudrates; see user's manual for details)

Serial Signals

RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
RS-422: TxD+, TxD-, RxD+, RxD-, GND
RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND
RS-485-2w: Data+, Data-, GND

LEDs

System: Ready

LAN: LED located on the RJ45 connector: 10M/Link x 2, 100M/Link x 2

Serial: TxD x 2, RxD x 2

Physical Characteristics

Housing: Aluminum (1 mm)

Weight: 190 g

Dimensions: 77 x 111 x 26 mm (3.03 x 4.37 x 1.02 in)

Mounting: DIN-Rail, wall

Environmental Limits

Operating Temperature:

Standard Models: -10 to 60°C (14 to 140°F)

Wide Temp. Models: -40 to 75°C (-40 to 167°F)

Storage Temperature:

Standard Models: -20 to 80°C (-4 to 176°F)

Wide Temp. Models: -40 to 85°C (-40 to 185°F)

Ambient Relative Humidity: 5 to 95% (non-condensing)

Anti-Vibration: 1 g @ IEC-68-2-6, sine wave (resonance search), 5-500 Hz, 1 Oct/min, 1 cycle, 13 min 17 sec per axis (UC-7110 only)

Power Requirements

Input Voltage: 12 to 48 VDC

Power Consumption: 4.5 W

- 170 mA @ 24 VDC
- 340 mA @ 12 VDC

Standards and Certifications

Safety: UC-7110/7112: UL 60950-1, CSA C22.2 No. 60950-1-03, EN 60950-1

EMC: EN 55022 Class A, EN 61000-3-2 Class A, EN 61000-3-3, EN 55024, FCC Part 15 Subpart B Class A

Green Product: RoHS, CRoHS, WEEE

Reliability

Alert Tools: Built-in buzzer and RTC (real-time clock)

Automatic Reboot Trigger: Built-in WDT (watchdog timer)

MTBF (mean time between failures):

- UC-7110: 149,414 hrs
- UC-7112: 148,980 hrs

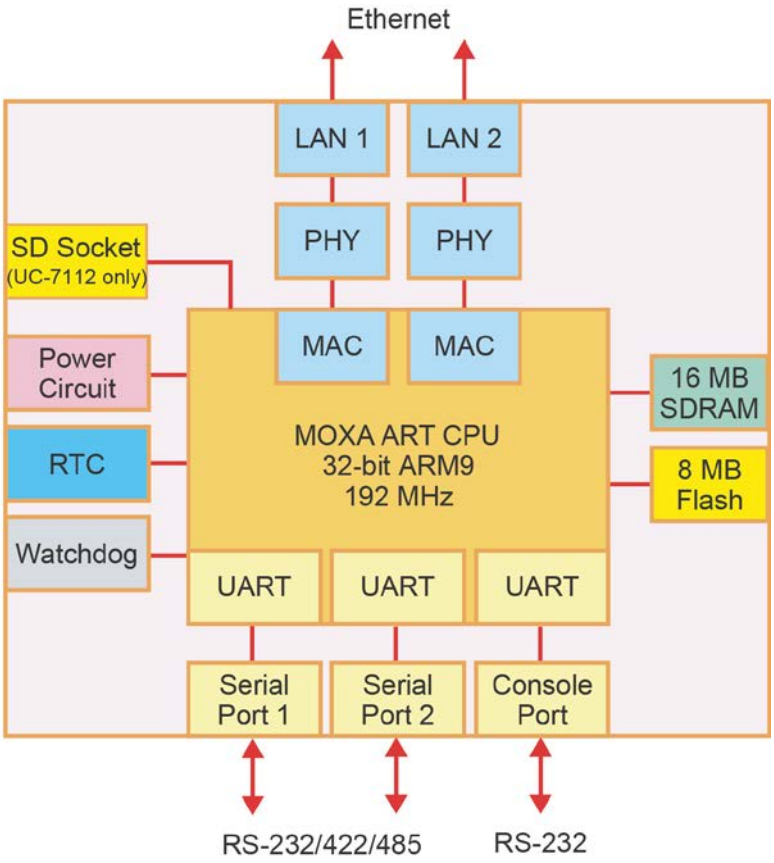
Warranty

Warranty Period: 5 years

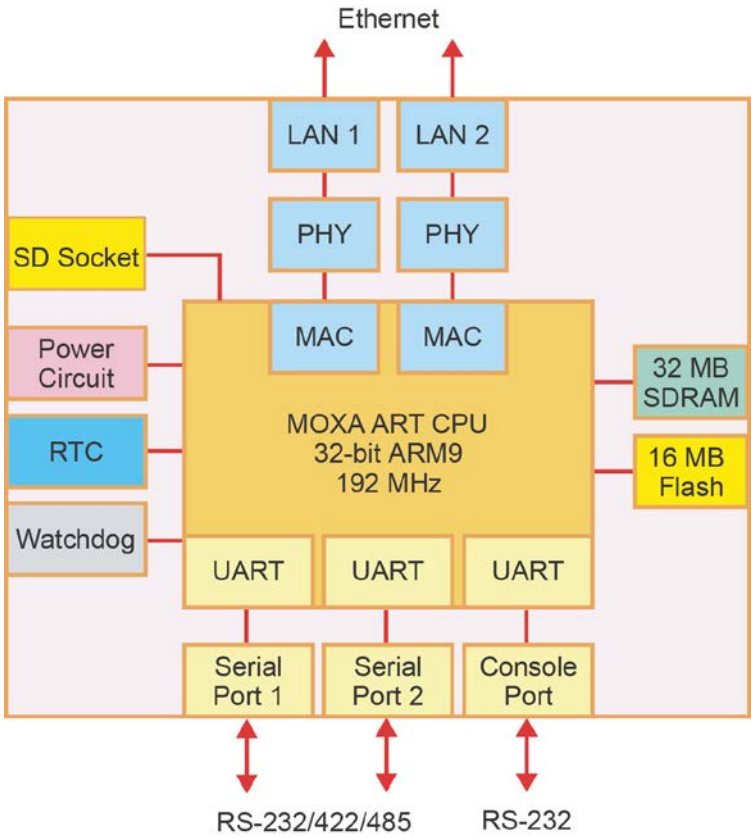
Note: The Hardware Specifications apply to the embedded computer unit itself, but not to accessories. In particular, the wide temperature specification does not apply to accessories such as the power adaptor and cables.

Hardware Block Diagram

UC-7110/7112-LX



UC-7112-LX Plus



2

Hardware Introduction

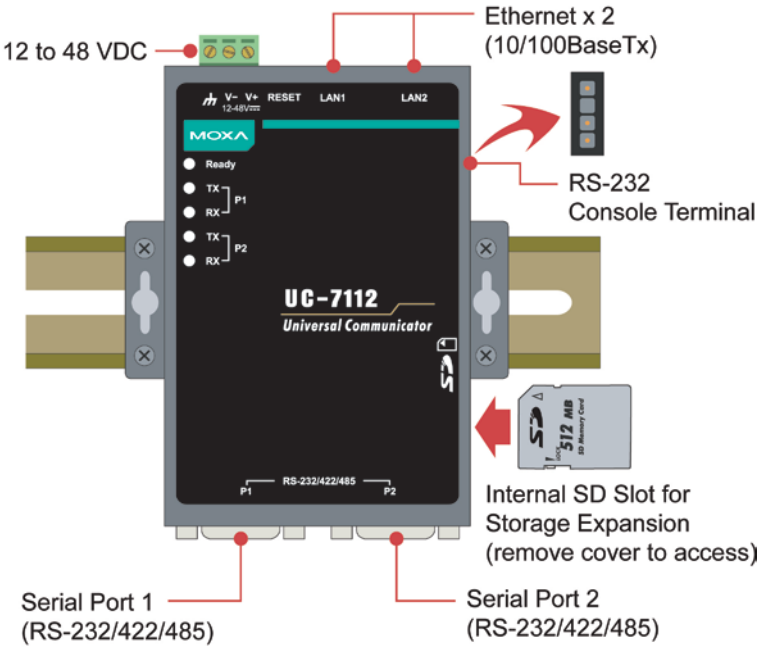
The UC-7110, UC-7112, and UC-7112 Plus are compact, rugged embedded computers designed for industrial applications. The LED indicators on the computers' outer casing help you monitor their performance, and assist in identifying trouble spots. The hardware platform is both reliable and stable, and is an ideal solution for adapting to custom applications. In this chapter, we cover the basic hardware of the UC-71xx series embedded computers.

The following topics are covered in this chapter:

- **Appearance**
- **Dimensions**
- **Panel Views**
- **LED Indicators**
- **Internal SD Socket**
- **Additional Functions**
  - Reset Button
  - Real Time Clock

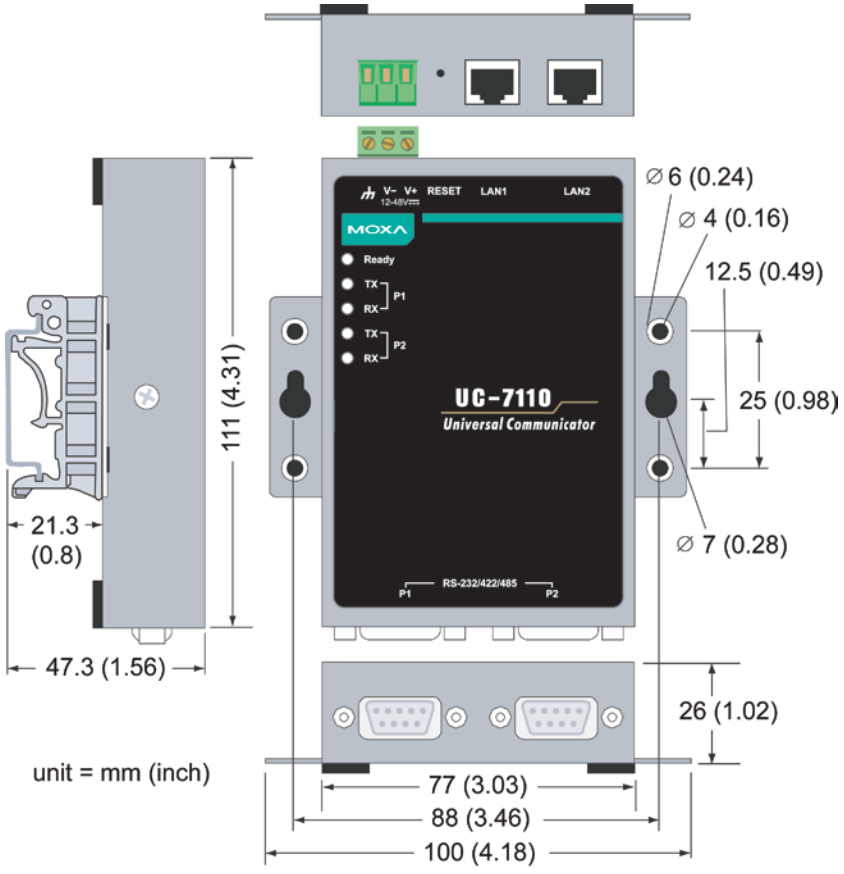
Appearance

The front view of the UC-7112 is shown in the following figure. The UC-7110 and UC-7112 Plus look the same, except that the UC-7110 does not have an internal SD slot.

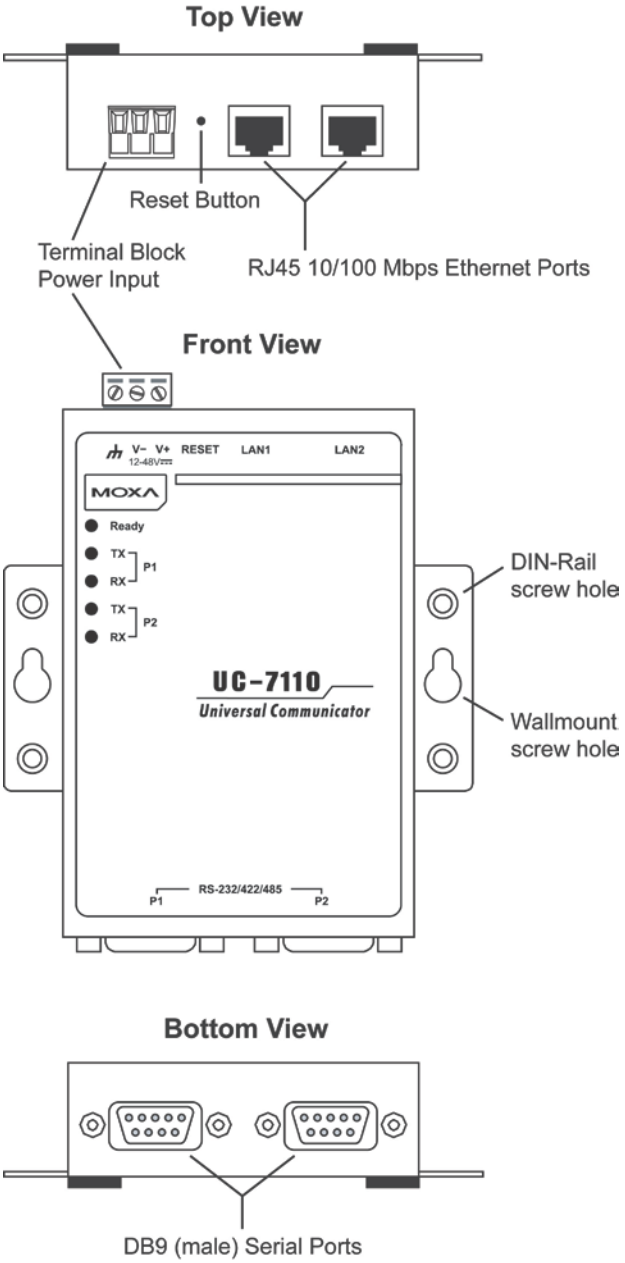


Dimensions

The dimensions of the UC-7110, UC-7112, and UC-7112 Plus are exactly the same.



Panel Views



LED Indicators

The following table is the key to the five LED indicators located on the front panel of the UC-71xx embedded computers.

LED Name	LED Color	LED Function
Ready	Green	Power is on and functioning normally.
P1/P2 (Tx)	Green	Serial port 1/2 is transmitting data.
	Off	Serial port 1/2 is not transmitting data.
P1/P2 (Rx)	Yellow	Serial port 1/2 is receiving data.
	Off	Serial port 1/2 is not receiving data.

Internal SD Socket

The UC-7112 and UC-7112 Plus have an internal SD socket for storage expansion that accepts Secure Digital (SDHC) SD 2.0 memory cards, for up to 16 GB of additional memory in the UC-7112 Plus, or 32 GB in the UC-7112.

Additional Functions

Reset Button

Press the “RESET” button continuously for more than 5 seconds to load the factory default configuration. After loading the factory defaults, the system will reboot automatically. The System Ready LED will blink for the first 5 seconds. We recommend that you only use this function if the software is not working properly. To reset the µClinux system software, always use the software reboot command (reboot) to protect the integrity of the data being transmitted. The reset button is NOT designed to hard reboot the UC-7110/7112 series embedded computer.

ATTENTION

For the UC-7110-LX and UC-7112-LX, resetting the embedded computer to factory defaults will NOT cause the user directory to be reformatted, and the user's data will NOT be deleted. The reset button only causes a configuration file to be loaded. All files in the /etc directory will revert to their factory defaults, but all other user data will remain intact in the Flash ROM.
For the UC-7112-LX Plus, resetting the embedded computer to factory defaults WILL cause the user directory to be reformatted; the files in the /home directory will be deleted, and all files in the /etc directory will revert to their factory defaults, but all other user data will remain intact in the Flash ROM.
Please note that if there is a problem with the /etc directory, the embedded computer may be unable to restore the factory default settings.

ATTENTION

This function only takes effect when the user directory is working correctly. If the user directory has crashed, the kernel will automatically load the factory defaults.

Real Time Clock

The real time clock in the UC-71xx embedded computers is powered by a lithium battery. We strongly recommend that you get help from Moxa’s technical support team to replace the lithium battery. If the battery needs to be changed, contact the Moxa RMA service team for RMA service.

ATTENTION

The battery may explode if replaced by an incorrect type. To avoid this potential danger, always be sure to use the correct type of battery.

3

Hardware Connection Description

In this chapter, we show how to connect the UC-71xx embedded computer to the network and to various devices.

The following topics are covered in this chapter:

- **Wiring Requirements**
  - Connecting the Power
  - Grounding the UC-71xx Embedded Computers
- **Connecting Data Transmission Cables**
  - Connecting to the Network
  - Connecting to a Serial Device
  - Serial Console Port
- **Installing a Secure Digital (SD) Memory Card**

Wiring Requirements

This section explains how to connect the UC-71xx embedded computers to serial devices.

You should heed the following safety precautions before installing any electronic device:

- Use separate paths for power wiring and wiring for devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.
  NOTE: Do not run signal or communication wiring and power wiring in the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.
- Use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separate.
- It is advisable to label the wiring to all devices in the system.

ATTENTION

Safety First!

Be sure to disconnect the power cord before installing and/or wiring your UC-71xx embedded computer.

Wiring Caution!

Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size.
If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

Temperature Caution!

Be careful when handling the UC-71xx embedded computer. When plugged in, the computer's internal components generate heat, and consequently the outer casing may feel hot to the touch.

Connecting the Power

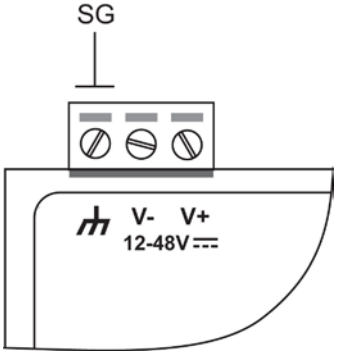
Connect the "live-wire" end of the 12-48 VDC power adaptor to the UC-71xx's terminal block. If the power is supplied properly, the "Ready" LED will glow a solid green color after a 25 to 30 second delay.

Grounding the UC-71xx Embedded Computers

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground wire from the ground screw to the grounding surface prior to connecting devices.

ATTENTION

This product should be mounted on a well-grounded mounting surface such as a metal panel.



SG: The ***Shielded Ground*** (sometimes called Protected Ground) contact is the left most contact of the 3-pin power terminal block connector when viewed from the angle shown in the figure at the left. Connect the SG wire to an appropriate grounded metal surface.

Connecting Data Transmission Cables

This section describes how to connect the UC-71xx to the network, to serial devices, and to a serial COM terminal.

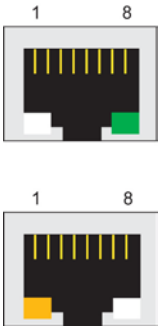
Connecting to the Network

Connect one end of the Ethernet cable to the UC-71xx's 10/100M Ethernet port, and the other end of the cable to the Ethernet network. If the cable is properly connected, the UC-71xx will indicate a valid connection to the Ethernet in the following ways:

- The top-right LED on the connector glows a solid green when connected to a 100 Mbps Ethernet network.
- The top-left LED on the connector glows a solid orange when connected to a 10 Mbps Ethernet network.
- The LEDs will flash when Ethernet packets are being transmitted or received.

The 10/100 Mbps Ethernet LAN 1 and LAN 2 ports use 8-pin RJ45 connectors. Pinouts for these ports are given in the following diagram.

8-pin RJ45



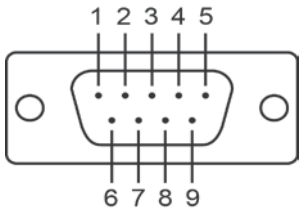
Pin	Signal
1	ETx+
2	ETx-
3	ERx+
4	---
5	---
6	ERx-
7	---
8	---

Connecting to a Serial Device

Connect the serial cable between the UC-71xx and the serial device(s).

The two serial ports (P1 and P2) use male DB9 connectors, and can be configured for RS-232/422/485 by software. The pin assignments are shown in the following table:

Male DB9 Port



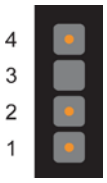
RS-232/422/485 Pinouts

Pin	RS-232	RS-422	RS-485 (4-wire)	RS-485 (2-wire)
1	DCD	TxDA(-)	TxDA(-)	---
2	RxD	TxDB(+)	TxDB(+)	---
3	TxD	RxDB(+)	RxDB(+)	DataB(+)
4	DTR	RxDA(-)	RxDA(-)	DataA(-)
5	GND	GND	GND	GND
6	DSR	---	---	---
7	RTS	---	---	---
8	CTS	---	---	---

Serial Console Port

The serial console port is a 4-pin pin-header RS-232 port. It is designed for serial console terminals, which are useful for identifying the UC-71xx's boot up message.

Serial Console Port & Pinouts



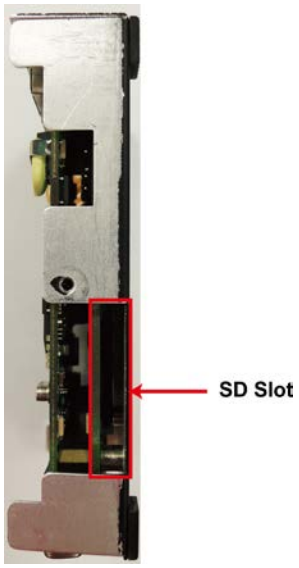
Pin	Signal
1	TxD
2	RxD
3	NC
4	GND

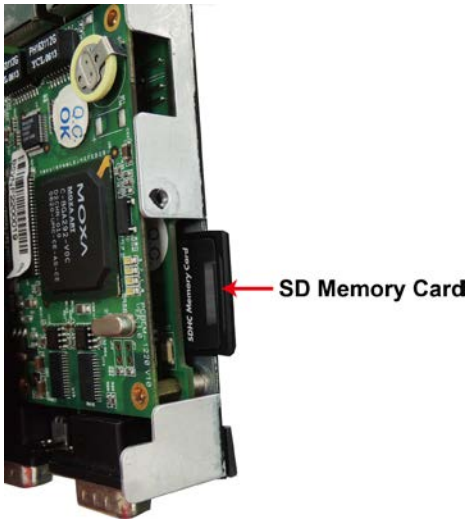
Serial Console Cable

Installing a Secure Digital (SD) Memory Card

To install an SD memory for the UC-7112/7112 Plus, follow these steps.

1. Remove two screws on each side of the computer; also remove the four screws beside the serial ports on the bottom panel of the computer. Remove the outer cover of the computer.
2. The SD slot is located at the right side of the computer. Insert the SD memory card into the slot. To remove the SD memory card, simply push the card.





3. Replace the outer cover of the computer, and fasten all screws to complete.